



International Journal of Production Research >

Volume 52, 2014 - Issue 2

1,349 87

Views

0
CrossRef citations to date

Altmetric

Articles

Reduction of power consumption and carbon footprints by applying multi-objective optimisation via genetic algorithms

Cheng-Hsiang Liu & Ding-Hsiang Huang

Pages 337-352 | Received 24 May 2012, Accepted 26 Jun 2013, Published online: 12 Aug 2013

Cite this article <https://doi.org/10.1080/00207543.2013.825740>

Check for updates



Full Article

Figures & data

References

Citations

Metrics

Reprints & Permissions

Read this article

Share

Abstract

Firms heavily emphasise reducing carbon footprint, an area warranting further improvement. This study examines carbon footprint within the context of production scheduling. Two multi-objective scheduling problems involving economic- and environmental-related criteria are studied: (1) a batch-processing machine scheduling problem to minimise the total weighted tardiness and carbon footprint simultaneously; (2) a triple-criteria scheduling problem involving of a hybrid flow shop consisting of a batch-processing machine followed by two parallel-processing machines, in which the shop attempts to minimise the total weighted tardiness, carbon footprint and peak power. Since the above problems are treated as a true multi-objective optimisation problem, decision-makers should select a solution among the trade-off solutions provided in the Pareto-optimal set. Therefore, the non-dominated sorting-based genetic

algorithm II (NSGA-II) is implemented, which identifies the set of approximate efficient schedules to both multi-objective scheduling problems. Moreover, an adaptive multi-objective genetic algorithm (AMGA) is developed to generate the reference Pareto front, which validates the results that are obtained using NSGA-II. Results of this study demonstrate both the effectiveness of AMGA in converging to the true Pareto-optimal set and the efficiency of NSGA-II.

Keywords:

scheduling

carbon footprint

total weighted tardiness

multi-objective genetic algorithms

Related Research Data

[Metaheuristic multiobjective optimisation approach for the scheduling of multiproduct batch chemical plants](#)

Source: [Journal of Cleaner Production](#)

[A framework to minimise total energy consumption and total tardiness on a single machine](#)

Source: [International Journal of Sustainable Engineering](#)

[Focusing in by-product recovery and waste minimization in batch production scheduling](#)

Source: [Computers & Chemical Engineering](#)

[Environmentally benign manufacturing: Observations from Japan, Europe and the United States](#)

Source: [Journal of Cleaner Production](#)

[An efficient constraint handling method for genetic algorithms](#)

Source: [Computer Methods in Applied Mechanics and Engineering](#)

[A New Shop Scheduling Approach in Support of Sustainable Manufacturing](#)

Related research

People also read

Recommended articles

Cited by
87

Information for

Authors

R&D professionals

Editors

Librarians

Societies

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

Open Select

Dove Medical Press

F1000Research

Help and information

Help and contact

Newsroom

All journals

Books

Keep up to date

Register to receive personalised research and resources
by email

 Sign me up

  

  

Copyright © 2026 Informa UK Limited Privacy policy Cookies Terms & conditions

Accessibility



Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG